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| 09/853,318      | 05/10/2001  | Takeshi Hoshida      | 064731.0184         | 5944             |

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| EXAMINER |
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LEUNG, CHRISTINA Y

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| ART UNIT | PAPER NUMBER |
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2613

DATE MAILED: 06/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

09/853,318

Applicant(s)

HOSHIDA, TAKESHI

Examiner

Christina Y. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 April 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6,9,11-14 and 17-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6,9,11-14 and 17-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 9, 11-13, 17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hakki et al. (US 6,549,311 B1) in view of Mueller et al. (US 2002/0036814 A1).

Regarding claims 1-3, Hakki et al. disclose a method for processing information in a receiver of a multichannel optical communication system (Figure 1), comprising:

receiving a wavelength division multiplexed (WDM) signal having a symbol rate and comprising a plurality of phase modulated optical information signals having a minimum channel spacing (column 2, lines 45-61);

demultiplexing the phase modulated optical information signals from the WDM signal (using demultiplexer 125; column 3, lines 10-16);

converting each of the phase modulated optical information signals to an intensity modulation optical information signal using an asymmetric interferometer (such as interferometer 150a; column 3, lines 16-26); and

receiving a data signal from the intensity modulated optical information signal (using detector 155a, for example; column 3, lines 26-36).

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Regarding claims 9 and 11, as similarly discussed above with regard to claim 1, Hakki et al. disclose an optical receiver for a wavelength division multiplexed (WDM) optical communication system (Figure 1), comprising:

a demultiplexer 125 operable to demultiplex a wavelength division multiplexed (WDM) signal into a plurality of phase modulated optical information signals, wherein the WDM signal comprises a symbol rate and the phase modulated optical information signals have a minimum channel spacing (column 2, lines 45-61; column 3, lines 10-16);

an asymmetric interferometer 150a operable to receive a corresponding one of the plurality of phase modulated optical information signals;

the asymmetric interferometer operable to convert the phase modulated optical information signal into an intensity modulated optical information signal (column 3, lines 16-26); and

a detector 155a operable to recover a data signal from the intensity-modulated optical information signal (column 3, lines 26-36).

Regarding claims 17 and 20, as similarly discussed above with regard to claims 1 and 9, Hakki et al. disclose a method for communicating information in a wavelength division multiplexed (WDM) optical communication system, comprising:

transmitting each of a plurality of data signals using phase modulation of a wavelength disparate carrier signal, the carrier signals having a minimum channel spacing (column 2, lines 45-61);

converting the phase modulation of the carrier signals into an intensity modulation using an asymmetric Mach-Zehnder interferometer 150a (column 3, lines 16-26); and

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receiving the data signal using a detector 155a coupled to an output of the Mach-Zehnder interferometer (column 3, lines 26-36).

Regarding claims 1-3, 9, 11, 17, and 20, Hakki et al. disclose a WDM signal inherently having some symbol rate or transmission bit rate value and having some minimum channel spacing value, but they are silent regarding specific values and do not specifically disclose a particular mathematical relationship between symbol rate and channel spacing.

However, it is well understood in the art that various symbol rates and channel spacings may be implemented in a WDM communication system such as disclosed by Hakki et al. In particular, Mueller et al. teach a system that is related to the one disclosed by Hakki et al., including wavelength division multiplexed, phase modulated signals (page 1, paragraph [0003], page 3, paragraphs [0024]-[0028]). Mueller et al. further teach that various symbol rates may be used (commonly from 10 Gb/s to 40 Gb/s, or as high as 160 Gb/s, or as low as 8 Gb/s; see page 1, paragraph [0003]; page 4, paragraph [0032]; and page 5, paragraph [0042]) and various channel spacings may be used (400 GHz or 100 GHz, for example; see page 7, paragraph [0054]). Examiner respectfully notes that a plurality of combinations of symbol rates and channel spacings in the ranges taught Mueller et al. result in a minimum channel spacing “greater than  $(N+0.4)B$  and less than  $(N+0.6)B$ , where  $B$  comprises the symbol rate of the WDM signal and  $N$  is an integer” or, regarding claims 2 and 20 in particular, a minimum channel spacing which is “substantially equal to  $(N+0.5)B$ ”. For example, one combination of values that are specifically cited by Mueller et al., 8 Gb/s symbol rate and 100 GHz channel spacing, has a relationship such that the channel spacing (100 GHz) is 12.5 times the symbol rate (8 Gb/s).

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Regarding claims 1-3, 9, 11, 17, and 20, it would have been obvious to a person of ordinary skill in the art to use channel spacing and symbol rate values such that a minimum channel spacing is greater than  $(N+0.4)B$  and less than  $(N+0.6)B$ , or substantially equal to  $(N+0.5)B$ , as suggested by Mueller et al. in the system disclosed by Hakki et al. as an engineering design choice of a particular channel spacing and symbol rate that effectively transmits the desired quantity of information in the communication system within the physical capabilities of the available hardware. Examiner respectfully notes that the fact that Applicants may have recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See Ex parte Obiaya, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Regarding claims 4 and 12, Hakki et al. disclose that the asymmetric interferometer comprises a Mach-Zehnder interferometer (column 3, lines 16-19).

Regarding claims 5 and 13, Hakki et al. disclose that the asymmetric interferometer comprises two interferometer paths having a path length difference operable to generate a one-bit shift in the optical information signal (column 3, lines 16-26).

3. Claims 6, 14, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hakki et al. in view of Mueller et al. as applied to claims 1, 9, and 17 above, and further in view of Ohshima (US 5,483,368 A).

Regarding claims 6, 14, 18, and 19, Hakki et al. in view of Mueller et al. describe methods and a system as discussed above with regard to claims 1, 9, and 17.

Further regarding claims 6, 14, 18, and 19, Hakki et al. disclose a detector 155a and that the asymmetric interferometer 150a comprises a Mach-Zehnder interferometer comprising a path

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length difference of one bit (column 3, lines 16-26) but does not specifically disclose that the Mach-Zehnder interferometer comprises complementary outputs or that the detector is a dual detector.

However, Ohshima teaches a related system including a Mach-Zehnder interferometer for converting non-intensity modulated signals into intensity-modulated signals for detection, and further teaches using a Mach-Zehnder interferometer with complementary outputs connected to a dual detector (Figure 7; column 7, lines 49-67; column 8, lines 1-9). Regarding claims 6, 18, and 19, it would have been obvious to a person of ordinary skill in the art to use the dual detector arrangement taught by Ohshima in the system described by Hakki et al. in view of Mueller et al. in order to effectively demodulate and detect the transmitted data.

#### ***Response to Arguments***

4. Applicant's arguments, see pages 7-11, filed 24 April 2006, with respect to previously presented dependent claims 8 and 16 (whose subject matter is now incorporated into independent claims 1 and 9) have been fully considered and are persuasive. Therefore, the rejections of those particular claims based on Willner et al. in view of Doerr and Ohshima and based on Chraplyvy et al. in view of Doerr, Willner et al., and Ohshima have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Hakki et al. in view of Mueller et al.

#### ***Conclusion***


5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
CHRISTINA LEUNG  
PRIMARY EXAMINER